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FOOD PROCESSING INNOVATION: A CASE STUDY WITH PRESSURIZED PASSION FRUIT JUICE

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Abstract

Tropical fruit juice production shows an annual increase in volume of 15 to 20% in Brazil. Growing demand for processed fruit pulp arouses juice industry interest to search for novel technologies. High Hydrostatic Pressure (HHP) is an innovative technology which allows juice production with improved sensory characteristics compared to pasteurization, meeting consumer demands for fresh-like foods. Despite recognized advantages of pressurized products described in the literature, a positive consumer attitude towards them is required to guarantee their success in today's competitive global market. The objective of this study was to evaluate the effect of packaging attributes on consumer expected liking and purchase intention of passion fruit juice. One hundred and twenty consumers evaluated twelve prototypes for expected liking and purchase intention. Data were analyzed using ANOVA, Conjoint and Cluster Analyses. Results showed that information about benefits of used technology (HHP) presented on the package played an important role on consumer attitude, suggesting a positive contribution to his/her satisfaction, a key point for the food industry.

Key-words: Consumer, Innovative technology, Passion fruit juice, Package

1. Introduction

Yellow passion fruit is a popular ovoid shaped fruit in Brazil and it is appreciated for its unique exotic flavor and bright orange color. Its pulp has a strong acid flavor and water and sugar are usually added to obtain a palatable juice. Despite being marketed world-wide, only few studies on this fruit have been reported in the literature (Deliza et al. 2004). Brazil is the largest yellow passion fruit producer and consumer in the world, with a production of 492.000 tons in 2004 (IBGE 2006). One of the most promising segments in Brazil is ready to drink fruit juice, showing an increasing production of 350 million liters in 2004 which represented US$ 420 million. This market share is being disputed by several industries which look for possibilities of developing novel foods (Monteiro 2006).

Food scientists and the food industry search for novel methods that may destroy undesired microorganisms with less adverse effects on product quality. High hydrostatic pressure (HHP) is being investigated as a non-thermal processing technique to destroy food-borne pathogens in order to enhance safety and shelf-life of perishable foods (Farkas and Hoover 2000). HHP refers to the process which subjects food to pressures of 100-900 MPa using normally water as the pressure transmitting medium (San Martín and Swanson 2002). At ambient temperatures pressures in the range of 300-500 MPa inactivate vegetative microorganisms and reduce the activity of enzymes, combined with retention of small molecules responsible for taste and color and many vitamins, resulting in a pressurized product which can be stored for a considerable time at 4-6ºC (Cheftel 1995). HP processing of fruit and vegetable products offers the chance of producing food of high quality, greater safety and increased shelf-life (Butz et al. 2003).

The main requirement this new technology must meet is to ensure product microbial safety while preserving sensory and nutritional characteristics to obtain products more similar to fresh foods (Torres and Velazquez 2005). HPP can enable ready to drink juice processors to produce innovative products with fresh-like, natural-like attributes and natural-looking colors which are all aspects valued by consumers nowadays (Deliza et al. 2005). Despite recognized advantages of pressurized products, a positive consumer attitude towards them is necessary to guarantee the success of the product in today's competitive global market (Butz et al. 2003; Cardello 2003; Deliza et al. 2005), i.e., every innovation has to be approved by consumers. Alignment of market supply to consumer needs and preferences is becoming even more important under existing market conditions of intense competition and highly demanding consumers. Increasingly, consumers not only want food products to be of high (sensory) quality but also to deliver specific benefits in terms of health, safety and environmental quality (van den Heuvel et al. 2007). Butz et al. (2003) carried out a survey with 3000 adults in France, Germany and the United Kingdom (UK), aiming at evaluating consumer attitudes towards 35 positive and 25 negative statements about this new technique in comparison to conventional ones. Results demonstrated that HHP processing was acceptable to the majority of consumers interviewed in France and Germany, with some reservations in the UK. Potential buyers were conditional ones. For them it was most important that pressurized products were not more expensive than conventional ones, and that there was a health benefit. For French people, quality and increased shelf life were also matters of concern. Those who perceived the greatest personal advantage from the technology were most likely to buy the products, and this group tended to include a higher proportion of young educated people.

Eighty eight consumers participated in a study carried out by Cardello (2003) aiming at assessing the relationship between concern levels for 20 technologies and ratings of expected liking and disliking, and the effect of expectations on actual product liking, within the context of theories of the effect of disconfirmed expectations on product acceptance. The results showed that females had significantly higher concern levels for all investigated technologies. Expected liking ratings were positively influenced by visual exposure to the product and by a safety and benefit statement. According to the author′s findings, for many products that are under development, and are either novel in sensory characteristics, ingredients, or processing, the primary driver of expected liking, prior to market introduction, will be the information that is provided to the public about the novelty of these variables.

The food industry is currently interested in a variety of novel production and processing technologies that may result in economical and improved quality products. In a study conducted by Cardello et al. (2007), conjoint analytic surveys were administered to 225 potential consumers of foods processed by innovative and emerging technologies in order to assess the factors contributing to their interest in using such products. The results showed that perceived risks of the technologies were the most important determinant of interest in their use by consumers, with irradiation and genetic modification being associated with the greatest negative impact on likely use, while high pressure processing produced the most positive effect. Among the benefits evaluated by consumers as the most important drivers to the use of HHP processed products, were "better tasting" and "better nutrition", so marketers should focus greater attention on these concepts in the future marketing of pressurized foods

Packaging and labeling of a food or beverage plays an important role in its selection once it is the major source of information for consumers (Deliza 1996). The right communication between the food label and packaging and the consumer appears to be critical to the success of the product (Sloan, 2003). Thus, label and packaging attributes are vital for consumer product perception and expected liking, also affecting product intention to purchase (Deliza et al. 1999a; Deliza et al. 1999b; Deliza et al. 2000; Deliza et al. 2003). One of the major difficulties in this kind of research is to quantify the effect of each packaging attribute on consumer expected liking and/or purchase intention of a particular product. Conjoint analysis is an appropriate statistical tool to investigate the effect of these attributes (Deliza et al. 2003; Moskowitz et al. 2004; Cardello et al. 2006; Moskowitz and Silcher 2006). Conjoint analysis derives from the field of mathematical psychology and psychometrics and has helped marketing professionals to understand the importance of product attributes and services on choice and buying processes (Malhotra 2001). It is a statistical technique through which the respondent's preference or any other dependent variable is decomposed to determine the inferred individual function and the relative importance of each attribute and their levels (Walley et al. 1999). It assumes an additive model in which the total utility, derived from the product consumption, represents the sum of the partial utilities associated to each product attribute. Each partial utility, denominated part-worth, indicates the influence of each level of a specific attribute on respondent's preference to a particular combination of attributes (Kupiec and Revell 2001).

Conjoint analysis can be used for several different applications, such as novel products and packaging development, estimation of market segmentation for a particular product, ingredient composition, determination of the favourite brand, market segmentation based on consumer preference and consumer preference simulation (Malhotra 2001). The data acquisition involves a sequence of several steps as follows: selection of a preference model; choice of the data collection method; construction of a set of stimuli; stimuli presentation; selection of the measuring scale for the dependent variable; and selection of the estimation method for analysing data (Green and Srinivasan 1978). The stimuli to be evaluated (hypothetical products) may be presented in different forms as: descriptive form; pictorial form; or three dimensional product representation (prototype) and may be more or less familiar to the participants of the study, according to Vriens et al. (1998), and van Kleef et al. (2005).

Cluster analysis, a multivariate statistical method, is applied to data obtained from consumer studies to identify groups of individuals with similar responses to product attributes. Since consumers may differ in their preferences and/or purchase intention ratings, it is of prime interest to identify segments among a panel of consumers (Westad et al. 2004; Sahmer, et al. 2006). Two methods may be used for Cluster analysis: hierarchical and non-hierarchical. The former consists in combining objects in consecutive clusters on the basis of similarity function value, where graphic representation of the obtained clusters is a cluster tree, denominated dendrogram. The latter focuses on grouping by means of k-averages, which consist in shifting objects from cluster to cluster in order to minimize variances within clusters and maximize variances between clusters (Rybowska and Babicz-Zielinska 2007).

Several studies have been carried out regarding package/label on consumer attitudes (Cardello and Sawyer, 1992; Raats et al. 1995; Deliza et al. 1996; Costa et al. 2000; Lange et al. 2000; Siret and Issanchou 2000; Jaeger and MacFie 2001; Lange et al., 2002; Deliza et al. 2003; Deliza et al. 2003; Sloan 2003; Carneiro et al. 2005; Deliza et al. 2005; Kihlberg, et al. 2005; van Kleef et al. 2005; Caporale et al. 2006; Cardello et al. 2006; Iaccarino et al. 2006; Enneking et al. 2007). Food selection and consumption are complex phenomena influenced by many different factors, which can be classified as marketing-related, psychological and sensory-related (Jaeger 2006). Contemporary consumption has much to do with identity, moral judgments and well-being. Triggering emotions by image, brand, or morals 'surrounding products' and production processes is important to consumers' choices in these days of widespread consumerism (Dagevos 2005).

Given the large literature that has been devoted to consumer perception of labeling and packaging, it is therefore rather surprising that the role of information about the used technology on consumer expected liking and purchase intention has not extensively investigated, mainly when this technology (HHP) delivers products according to needs of consumers, i.e., fresh, safe and with nutritional properties preserved. Very few articles available in the literature address consumer perception of products processed by HHP (Butz et al. 2003; Cardello 2003; Deliza et al. 2005; Cardello et al. 2006) and none referred to pressurized passion fruit juice.

The objective of this study was to investigate the effect of packaging attributes; especially the information on the innovative technology – HHP - on consumer expected liking and intention to purchase of ready to drink passion fruit juice.

2. Material and Method

2.1. Passion fruit juice packaging prototypes used in the study

Twelve passion fruit juice packaging were created, using the Corel® program (licensed for Embrapa Food Technology), by manipulating five packaging factors (background color, brand, price, information on preservatives and information on the technology), the first four with two levels each and the fifth with three levels. The SAS software (Statistical Analysis System – SAS Institute Inc., Caroline Cary, NC, USA, 1999-2001, version 8.2, licensed for Embrapa) was used to generate an orthogonal main-effect fractionated factorial design (Green and Srinivasan 1978) that minimizes the number of stimulus concepts (treatments) required for the study. Table 1 presents the factors and their levels. The packaging attributes were incorporated into labels according to Brazilian Food Legislation labeling norms (Brasil 2003). They were printed in adhesive glossy paper and stuck on 200mL passion fruit juice packages. The following parameters were kept alike in all prototypes: expiration date; nutritional facts; passion fruit illustration; package shape; bar code; product denomination and ingredients. A dummy sample was used in the study to minimize first sample bias (Deliza 1996; Plemmons and Resurreccion 1998). Figure 1 shows two passion fruit packages used in the study. Table 2 describes the 13 evaluated packages.

Table 1: Package features and respective levels used in the experiment

Feature	Level	Description
Information about the used technology	3	1. Pressurized juice: juices are submitted to high pressures in order to guarantee their preservation, maintaining fresh-fruit like flavor and preserving the vitamins. 2. Pasteurized juice: juices are submitted to heat to guarantee their preservation. 3. No information about the technology
Brand	2	1. Brand A (hypothetical) 2. Brand B (the Brazilian market leader)
Background color	2	1. Write 2. Orange
Information on preservative	2	1. No preservatives 2. No information about preservatives
Price[§]	2	1. Low (R$1.02) 2. High (R$1.69)

[§] using the Brazilian currency Real (R$).

Figure 1. Two passion fruit juice packaging prototypes used in the study. (a) refers to the prototype P3, and (b) refers to the prototype P7.

Table 2
Description of the prototypes used in the study

	Package attributes			
Prototype	**Information on the technology**	**Price**	**Br and**	**Background color**	**Information on preservatives**
P1	pressurized juice	low	hypothetical market	orange	no preservatives
P2	pressurized juice	low	leader	orange	no information
P3	pressurized juice	high	hypothetical market	white	no information
P4	pressurized juice	high	leader	white	no preservatives
P5	pasteurized juice	low	hypothetical market	white	no information
P6	pasteurized juice	low	leader	white	no information
P7	pasteurized juice	high	hypothetical market	orange	no preservatives
P8	pasteurized juice	high	leader	orange	no preservatives
P9	no information about the technology	low	hypothetical market	orange	no preservatives
P10	no information about the technology	low	leader	white	no preservatives
P11	no information about the technology	high	hypothetical market	white	no information
P12	no information about the technology	high	leader	orange	no information
P13 (dummy)	no information about the technology	low	hypothetical	white	no information

2.2. Expected liking and intention to purchase experiments

One hundred and twenty fruit juice consumers participated in this study which was carried out at EMBRAPA Food Technology Sensory Lab. Sixty-five of them were female and fifty-five male, aged between 17 and 62 year old, all from Rio de Janeiro. Samples were monadically presented to participants in sensory booths under white lighting. The order of presentation was balanced to avoid carry-over effects (MacFie et al., 1989). Consumers were told to look at each passion fruit juice package mimicking a shopping situation, and rate their expected liking and intention to purchase (Deliza et al. 2005). The response scale was a nine point structured scale, anchored at opposite ends with the expressions “dislike extremely” and “like extremely” when the expected liking of the juice was evaluated, and “I definitively would not buy” and “I definitively would buy” for the purchase intention assessment (Stone and Sidel 2004). Their ratings were converted into numbers (1 to 9) and the data were analysed using Analysis of Variance (ANOVA), Conjoint and Cluster analyses, employing SAS (1999) and XLSTAT-MX (2005).

3. Results and Discussion

3.1 Preference results

The mean values for the consumer expected liking are shown in Figure 2a. Prototypes P1, P2, P4 and P8 received the highest score for the expected liking ($p \leq 0.05$). On the other hand, prototype P11 had the lowest mean ($p \leq 0.05$). No difference ($p \leq 0.05$) was found among prototypes P3, P6, P7, P9, P10 and P12 regarding the expected liking, but they were less liked ($p \leq 0.05$) than the previous P1, P2, P4, and P8. P5 differed significantly ($p \leq 0.05$) from all samples, except P10. Mean values for expected liking tended to be significantly higher for packaging prototypes with the following attributes: pressurized juice, familiar brand, orange background, low price and absence of preservatives. The information on the absence of preservatives seemed to be important when an unknown brand had also an orange background color, and a low price; or for a familiar brand with a white package background, high price and pressurized juice. The statement “no preservatives” was important when a familiar brand came together with an orange package background and a high price, for the pasteurized product.

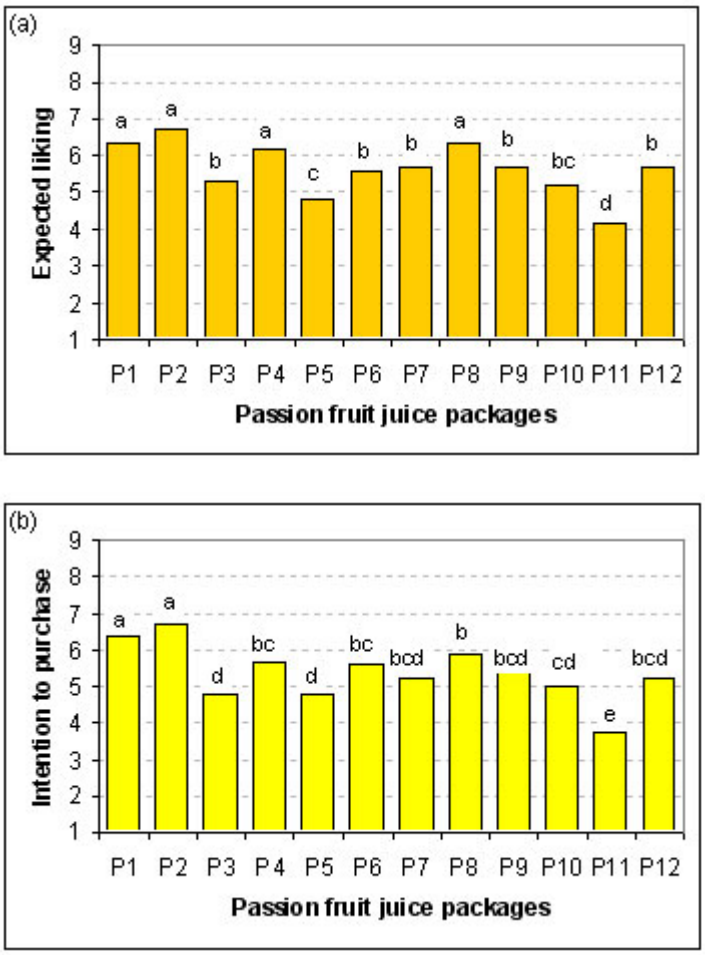

Figure 2. Passion fruit juice means: (a) expected liking[§] and (b) intention to purchase[§]
Different letters denote a statistically significant difference by Tukey test ($p \leq 0.05$). [§] Evaluated in non-structured scale varying from: 1 = I will dislike extremely/ definitively would not buy; 9 = I will like extremely/ definitively would buy.

3.1.1. Conjoint Analysis results for the expected liking

Twenty-one consumers whose data did not fit into the model, i.e., those consumers whose results from ANOVA did not show a significant effect ($p>0.20$) for any packaging attribute were excluded from further analysis. The remaining 99 people presented different part-worths in relation to the expected juice liking. Cluster analysis was used to group consumers in segments based on the similarity regarding their expected liking responses. Two segments of consumers were identified. Segment 1 with 64 people, and segment 2 with 35 consumers. Figure 3 shows the dendrogram from cluster analysis. The part-worths and relative importance (RI) of all packaging attributes concerning the expected passion fruit juice liking for segments 1 and 2 are presented in Figure 4. Negative bars in Fig. 4 reflect negative impact on the consumer expected liking. The information on the innovative processing technology (high hydrostatic pressure) applied to passion fruit juice production had a significant effect ($p \leq 0.05$) on consumer expected liking, with a RI of 32.0% for consumers in segment 1. No information about processing technology and about preservatives led to a negative impact on consumer expected liking of passion fruit juice. Pasteurization also had a negative impact on expected liking for consumers in this segment. The R.I of brand was 23.3%, followed by information on preservatives with a RI of 18.3%, and background color with 16.6% for this same group of consumers. White background color and the unfamiliar brand A also contributed to a negative impact on the expected liking for this group of consumers. Price had no effect for consumers in segment 1.

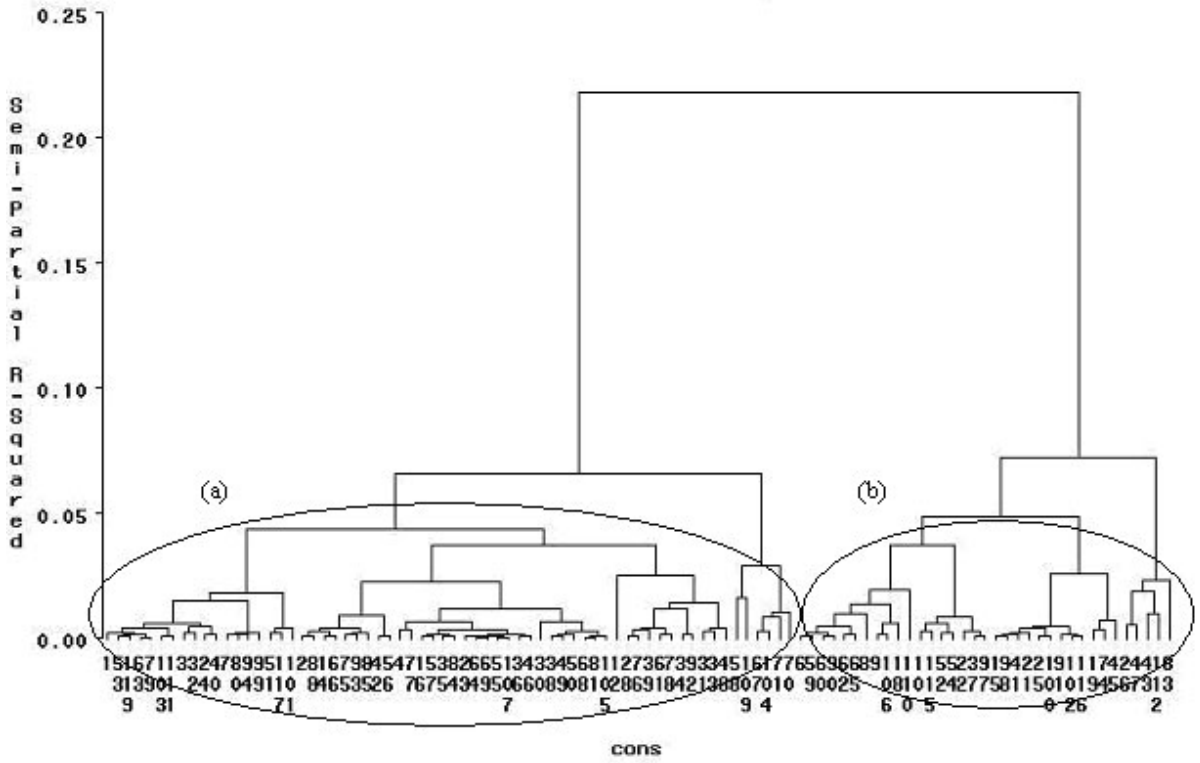

Figure 3. Consumer expected passion fruit juice liking dendrogram showing the two segments of consumers: (a) segment 1 (n=64), and (b) segment 2 (n=35).

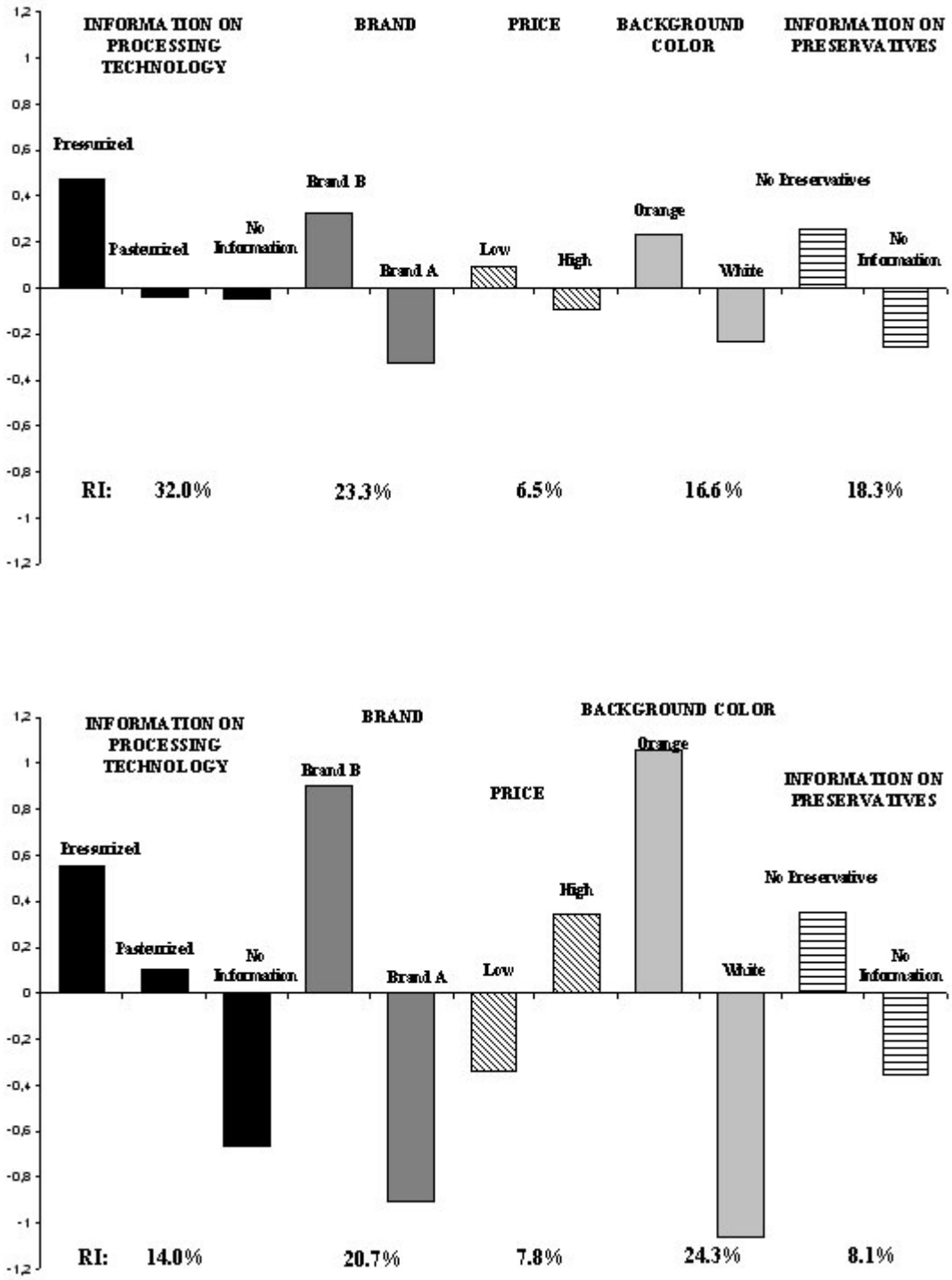

Figure 4. Part-worths and relative importance (RI) of the package attributes on the expected liking of passion fruit juice: (a) segment 1 (n=64), and (b) segment 2 (n=35).

In relation to consumers in segment 2, the background color had a significant effect ($p \leq 0.05$) on the expected liking with a RI of 24.3%, followed by brand with 20.7%, information about the used technology applied to the juice production with a RI of 14.0%, information on preservatives with a RI of 8.1%, and price with a RI of 7.8%. The lack of information about processing technology and about preservatives led to a negative impact on the expected passion fruit juice liking for people in segment 2. The white background color, the unfamiliar brand A and low price also had negative impact on the expected liking for this group of consumers.

These results suggest that consumers from segment 1 valued mostly the packaging attributes information on processing technology, brand, background color and information on preservatives, while those from segment 2 were more affected by information on processing technology, brand and background color, when evaluated the expected passion fruit juice liking.

3.2 Intention to purchase results

The consumer intention to purchase mean values considering the 12 evaluated passion fruit juice packages are shown in Figure 2b. P1 and P2 received the highest scores ($p \leq 0.05$). On the other hand, prototype P11 presented the lowest intention to purchase mean ($p \leq 0.05$). The second highest mean related to purchase intention was attributed to sample P8, followed by samples P4 and P6. Prototypes P7, P9 and P12 did not present statistically significant difference ($p \leq 0.05$) in relation to purchase intention, reaching the fourth position. P4, P6, P7, P8, P9 and P12 were not significantly different ($p \leq 0.05$) among themselves. The fifth position of purchase intention was for P10, which presented no significant difference ($p \leq 0.05$) from samples P7, P9 and P12. The sixth position related to purchase intention was to P3 and P5. Samples P3 and P5 were not significantly different ($p \leq 0.05$) and also showed no significant difference ($p \leq 0.05$) from P7, P9 and P12 concerning intention to purchase. Mean values for purchase intention tended to be significantly higher for packaging prototypes with the following attributes: pressurized juice, orange package background and low price. No preservatives was important in association with an unfamiliar brand, while no information on preservatives seemed to be important associated with a familiar brand concerning juice purchase intention.

3.2.1. Conjoint Analysis results for the intention to purchase

Seventeen consumers whose data did not fit into the model, i.e., those consumers whose results from ANOVA did not show a significant effect ($p > 0.20$) for any packaging attribute were excluded from further analysis. The remaining 103 consumers presented different part-worths in relation to the juice intention to purchase, and two consumer segments were identified. The dendrogram is shown in Figure 5. The part-worths and relative importance (RI) of all packaging attributes concerning the purchase intention of passion fruit juice for segments 1 (n=56) and 2 (n=47) are presented in Figure 6. A negative bar reflects negative impact of the corresponding part-worth on the juice purchase intention by the consumer. All manipulated packaging attributes were significant ($p \leq 0.05$) for consumers in segments 1 and 2. The brand presented a RI of 28.3%, followed by background color with a RI of 26.9% for consumers in segment 1. White background color and the unfamiliar brand A also led to a negative impact on purchase intention for this group of consumers. The information about processing technology applied to the juice production had a significant effect ($p \leq 0.05$) on consumer purchase intention with a RI of 10.0% for consumers from segment 1. Information about preservatives presented a RI of 8.3%, followed by price with a RI of 7.2%. No information on processing technology and preservatives led to a negative impact on consumer purchase intention of passion fruit juice. Pasteurization also had a negative impact on purchase intention for consumers from this segment, as well as low price. In relation to consumers in segment 2, information about the processing technology applied to passion fruit juice production had a significant effect ($p \leq 0.05$) on consumer purchase intention with a RI of 39.2%, followed by price with a RI of 22.5%, information about preservatives with a RI of 11.0%, background color with a RI of 9.8% and brand with a RI of 8.7%. No information about processing technology and about preservatives led to a negative impact on the intention to purchase of people in segment 2. White background color, the unfamiliar brand A, and a high price also had a negative impact on intention to purchase for this group of consumers.

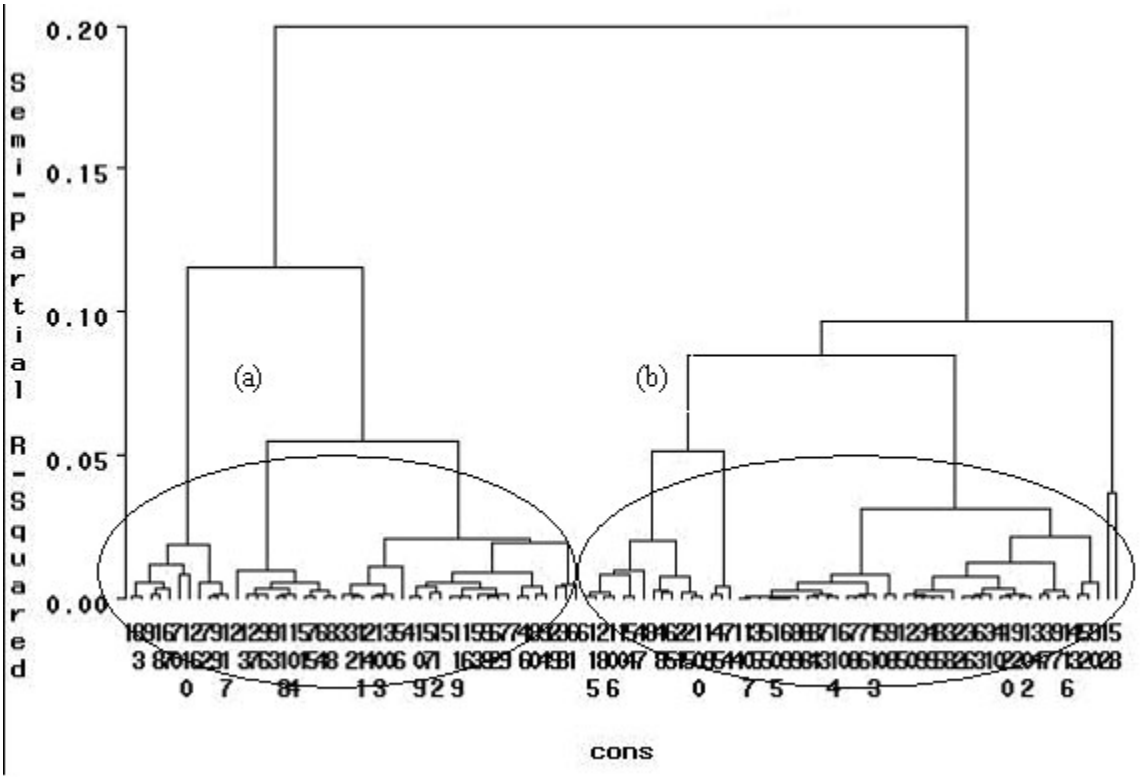

Figure 5. Consumer passion fruit juice intention to purchase dendrogram showing the two segments of consumers: (a) segment 1 (n=56), and (b) segment 2 (n=47). .

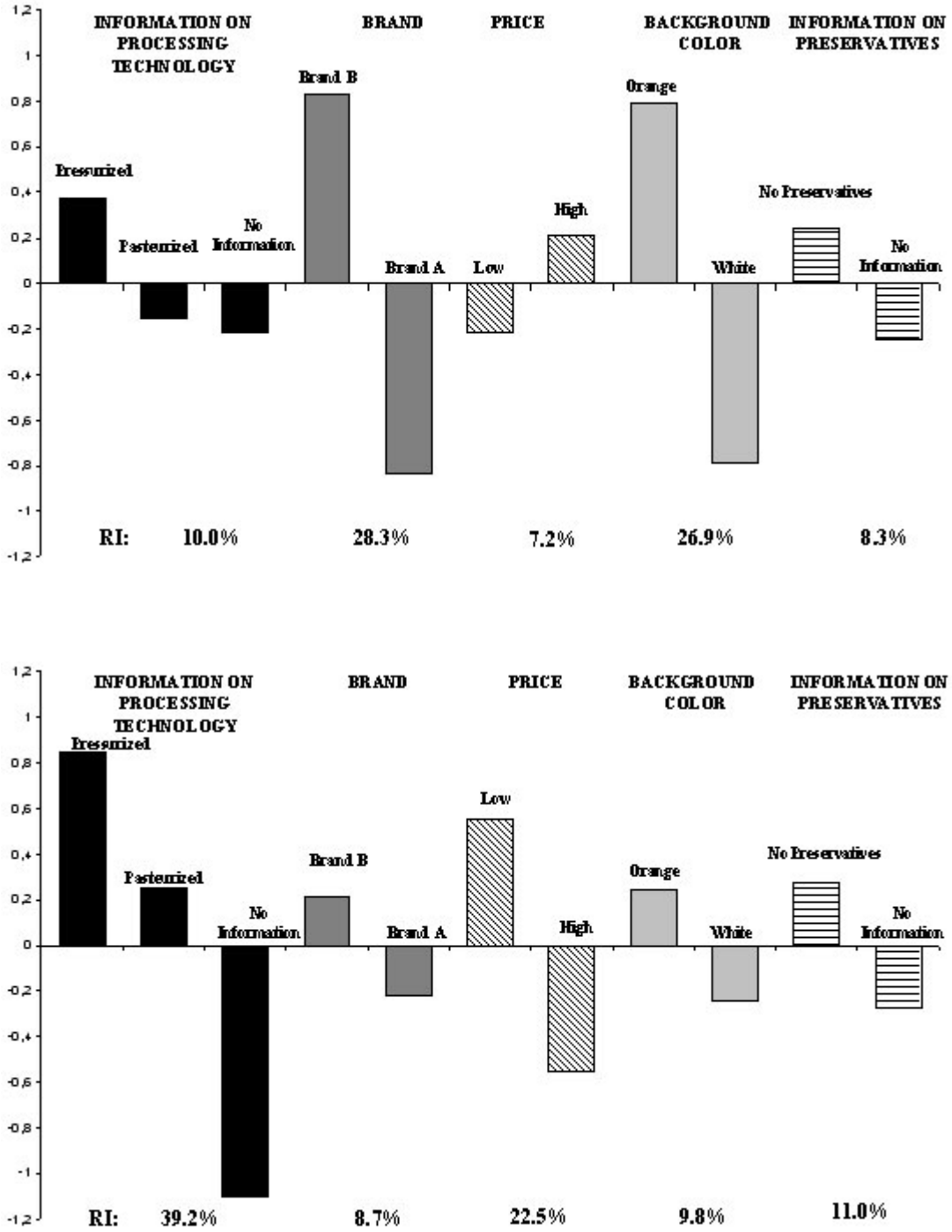

Figure 6. Part-worths and relative importance (RI) of the package attributes on the consumer intention to purchase of passion fruit juice: (a) segment 1 (n=56), and (b) segment 2 (n=47).

These results suggest that consumers from segment 1 valued mostly the packaging attributes brand, background color and information on processing technology, while those from segment 2 valued information on processing technology, price and information on preservatives when evaluating the passion fruit juice intention to purchase.

3.3 Discussion

Costa et al. (2000) investigated the effect of four packaging attributes (information on different manufacturing processes, brand, price and label image) on consumer intention to purchase towards vegetable oils in Brazil and the UK (Deliza et al. 1999). The information on the oil manufacturing processes included traditional process; genetic engineering and environmentally friendly technology. Data were submitted to Conjoint and Cluster analyses and three consumer segments were identified. The factors which influenced mostly consumer purchase intention were label image for segment 1; price and brand for segment 2 and information on processing technology for segment 3, with consumers preferring products associated with information about "environmentally friendly processing methods". The authors demonstrated the importance of the used technology on the consumer product evaluation

Conjoint and Cluster analyses were applied by Dantas (2001) to evaluate the impact of five packaging factors (price; background color; product visibility; information about processing and nutritive value; and type of production) on the Brazilian consumer purchase intention of minimally processed cabbage. Only one consumer segment was formed with the attributes information (no preservatives, stays fresh and nutritious under refrigerated storage) and type of production (no chemical products or organic production) being the most important.

Deliza et al. (2003) carried out a study in which 24 computer generated package images were presented to consumers unfamiliar with passion fruit juice. Six packaging factors (background color, picture, information, brand, language and shape) had been manipulated to create these images and consumers were asked to rate six expected sensory attributes (sweetness, pureness, sharpness, refreshing, freshness, naturalness) and liking. Results revealed significant effects for several attributes, with background color and information being the most important, followed by picture and brand. Consumers were segmented in four groups, based on the similarity of their parth-worths for the six package features. Results from segment 1, the largest group of consumers, indicated that information and background color were important in the consumer expected preference, followed by brand and language. Consumers in segment 4, the second largest group, used three package features with the picture factor dominating, followed by information and brand. Segments 2 and 3 were smaller and based their evaluation on the information. The role of brand on the expected liking of passion fruit juice was also significant. Results from the present study concerning passion fruit juice expected liking identified two segments of Brazilian consumers. Segment 1 valued the packaging attributes information on processing technology, brand, information on preservatives and background color, while the attributes background color, brand and information on processing technology were valued mostly by consumers in segment 2. Although the package attributes manipulated in the presented studies were not the same, results from both studies had some similarity concerning the packaging factors considered by consumers regarding the expected liking. Despite the existing cross cultural differences, it has been stressed the important role played by label information on consumer attitude.

Deliza et al. (2005) investigated the effect of label attributes on the Brazilian consumer attitude towards pineapple juice. Packaging prototypes were created manipulating five attributes (brand, price, production type, product definition and technology information). The attribute "technology information" comprised: "pressurized, nutritious with more flavor"; "pressurized" with no further explanation; and no information about the processing technology. Results showed that when the technology advantages were presented to consumers, they understood the benefits and expressed a higher purchase intention. However, information about HHP technology without additional information led to a negative impact on consumer purchase intention. Price and brand were also significant for the pineapple juice consumer intention to purchase. In the present study with pressurized passion fruit juice, consumers from segment 1 gave priority to the attributes background color and information on processing technology, while in segment 2 consumers valued mostly the attributes information on processing technology and price. Information on the technology of pressurization associated with benefits resulted in higher purchase intention for both segments, confirming the previous findings. It also led to a positive impact on juice expected liking for consumers from both segments. These findings arise the fruit juice industry interest since this technology offers unique opportunities for the development of new products. However, the juice processor must be aware of the importance of adequate communication strategies to inform consumers about the HHP technology, emphasizing its benefits.

The study presented by Soares (2005) also demonstrated the importance of the technology on the consumer perception of lettuce. By manipulating four packaging attributes including the information on the type of production (conventional production; no pesticides; no pesticides + health benefits; no pesticides + environmental benefits; organic; organic production + health benefits; and organic production + environmental benefits), three consumer segments were identified. Results from segments 1and 3 indicated that information on the type of production

(no pesticides + environmental benefits; and organic production + environmental benefits), and price had a significant effect on the consumer intention to purchase of lettuce, while consumers from segment 2 were dominated by both the information on the type of production (no pesticides + health benefits and organic production + environmental benefits) and packaging material (tray covered with film wrapping).

It is interesting to notice that consumer attitude towards HHP technology was much alike in the United States and Brazil, considering the findings presented by Cardello et al. (2006), and this one. Such results opens a new area for the development of foods processed by emerging technologies, as pressurization. The results suggest that HHP processing may find more rapid acceptance among consumers compared to other emerging technologies.

In most of the previously described studies, the attributes "information on processing technology" or "information on type of production" significantly contributed to the product expected liking and /or purchase intention evaluation by the consumer, as reported in this experiment. Adequate labels and the information they carry will become more important than ever, due to consumer increasing demands for nutritious, healthy and convenient foods. Based on this study findings and the experiments described in the literature, it is recommended that the food industry utilizes the predictive power of Conjoint and Cluster analyses for the design and evaluation of novel food products, following a consumer oriented product development approach.

4. Conclusions

Results showed that the information about benefits of processing technology (HHP) presented on the package played an important role on consumer expected liking and intention to purchase. This attribute significantly contributed to consumers' evaluation of passion fruit juice, revealing the power of this information on the package. These results substantiate the need to investigate more thoroughly the role of extrinsic attributes, which may contribute to consumer satisfaction, a key point for food industry competitive advantage nowadays. Further studies are recommended to take into account the role of these features on the sensory evaluation of passion fruit juice samples.

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